FIBERGLAS

Insulations

FOR

PIPES, FITTINGS AND BOILERS

FIBERGLAS®
FIBERGLAS CANADA LIMITED

A.I.A. NO. 37-B

GENERAL SALES OFFICE: 1200 BAY STREET, TORONTO 5, ONT.

FIBERGLAS
CANADA
LIMITED

INDEX

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TYPICAL COVERING SPECIFICATIONS

1. HOT PIPING

(a) Cover all steam pipes and returns, as well as all hot water heating piping and domestic hot water piping and circulation piping installed in the boiler with a standard or suitable thickness of Fiberglas PF Pipe Insulation. Exposed Pipe Covering shall be recovered with canvas neatly pasted on.

(b) Cover all fittings, with an equal thickness of Fiberglas Insulating cement, trowelled smooth to match adjoining covering, and recovered with canvas neatly pasted on.

2. COLD PIPING

(a) Cover all cold water, soil, waste and horizontal rain-water leaders, with standard thickness of Fiberglas PF Pipe Insulation. Recover with oiled paper and re-finish with canvas neatly pasted on.

(b) Cover all fittings with an equal thickness of Fiberglas Insulating cement and Vapour-proof mastic, trowelled smooth to match adjoining covering. Seal all joints before recovering with canvas neatly pasted on.

3. BOILER, TANKS & CONVERTORS

Cover the boiler, hot water storage tanks and convertors with a suitable* thickness of Fiberglas Metal Mesh Blanket or a suitable* thickness of Fiberglas blocks securely wired in place. Over metal mesh or blocks stretch and lace poultry netting and apply 1/2" thickness of Fiberglas cement trowelled to a smooth hard finish. Finish with canvas neatly pasted on.

4. BREECHING

Cover the breeching with a suitable* thickness of Metal Mesh Blankets style "RH" or Fiberglas Insulating Blocks on 1" Hi-Rib expanded metal lath, wired on and finished with 1/2" Fiberglas cement trowelled to a smooth hard finish, with canvas neatly pasted on.

5. PAINTING

Painting shall be done by others.

*Consult chart on page 4 for thicknesses.

FIBERGLAS PF PIPE INSULATION

Fiberglas PF Pipe Insulation is now being made in Canada in a series of prime sizes and thicknesses, which fit exactly over or into another size and thickness. With the new Fiberglas PF Pipe Insulation, stock requirements are cut by about 40%. Accurate shaping of the material to conform exactly with pipe sizes makes joints practically invisible and no offsets or bulges can occur when recommended methods of application are used.

FIBERGLAS PF PIPE INSULATION

APPLICATION

Fiberglas PF Pipe Insulation is applied according to standard practices existing in the trade. Applied according to suitable specifications, Fiberglas PF Insulation may be used indoors, outdoors, or underground on pipes operating at temperatures from sub-zero to 600° F.

Muslin-covered hemicylinders are applied by loosening the canvas to open one side, setting the insulation in place around the pipe, and pasting the muslin back in place. The brass-lacquered bands furnished with each hemicylinder are then set in place -- one in the middle and one near each end. Segments, furnished for pipes in excess of 12 inches, are wired in place and covered with the prescribed lagging or protective cover. Whenever insulation is wired in place, three loops of soft annealed wire (16 gauge) should be used. When applying double-layer insulation, the first layer is wired in place with no jacket. The second layer is then set in place with staggered joints to eliminate points of high heat loss. Joints at valves, elbows, or other irregular fittings should be insulated with Fiberglas Insulating Cement and finished the same as the rest of the pipe to present a uniform appearance.

Indoor finishes may be 4, 6, or 8 ounce canvas applied directly over the insulation, or applied over 40-lb. resin-sized paper or 16 lb. asbestos paper. Fiberglas lagging cloth or tape is recommended where fire safety is required or where high temperature or chemical conditions warrant. The surface may be painted. Satisfactory outdoor finishes include 55-lb. roofing felt, sheet metal, or the roofing felt jacket supplied on Fiberglas PF Pipe Insulation, Underground Type. All laps should be securely sealed. Roofing felt should be secured with 16 gauge copper wire loops, six inches on center.

THERMAL CONDUCTIVITY. The conductivity of Fiberglas PF Pipe Insulation is exceptionally low. Its structure forms an enormous number of minute air spaces within the material. They provide a high resistance to heat transmission, producing a highly efficient insulation. Conductivity chart is shown in the second column on page 3.

A characteristic of particular importance is the substantial elimination of heat loss through joints. The fibers at the joints tend to knit themselves together so that no measurably greater heat loss occurs at the joints than through the bulk of the covering. The conductivity of sizes 2" and under is slightly higher than the charted curve; both sizes have a conductivity substantially lower than that of comparable coverings of other materials.

MOISTURE RESISTANCE. The individual glass fibers from which Fiberglas PF Pipe Insulation is made are nonhygroscopic and nonabsorbent. Fiberglas PF Pipe Insulation has extremely low moisture absorption (gain in weight from water vapor).

LIGHT WEIGHT. Lightness is one of the greater advantages of this pipe insulation. Its inherent lightness facilitates application, packaging and shipping, and makes it possible to ship sections and segments in corrugated paper boxes rather than in crates.

RUGGEDNESS. Fiberglas PF Pipe Insulation is tough and resilient. Its high strength-density ratio enables it to resist mechanical shock, making it possible to form and ship large sections. Edges of sections or segments stand up well under careful handling.

LOAD-BEARING CAPACITY. Fiberglas PF Pipe Insulation has sufficient load-bearing capacity to withstand occasional weight of workmen who may stand on it during application. Should the pipes be located where the insulation will receive continual abuse, the covering should be protected with suitable sheathing.

DURABILITY. Fiberglas PF Pipe Insulation is made from inorganic fibers except for a small percentage of thermo-setting binder used. Prolonged accelerated weathering tests made on Fiberglas fibers, in which succeeding cycles of heat and moisture, cooling and condensation, and heat and drying were imposed have proved the physical and chemical stability of the fibers.

HANDLING QUALITIES. Fiberglas PF Pipe Insulation is manufactured in forms that are easily applied. The materials are notably light in weight and are shipped in paper cartons. The pipe insulation has adequate strength for shipping, handling and applications under all ordinary service conditions. Care should be taken during application to prevent it from being dropped.

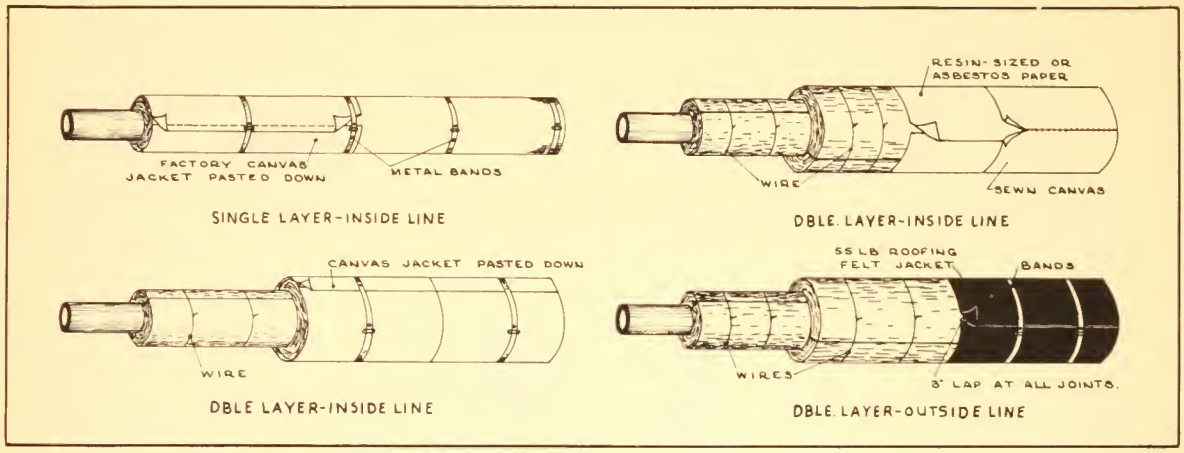
SANITARY. Fiberglas PF Pipe Covering is immune to rot and decay. It is odorless and it will not absorb odors. It provides no sustenance for insects or vermin.

FIBERGLAS PF PIPE INSULATION

TOTAL HEAT LOSSES AND EFFICIENCIES

Pipe Surfaces in Still Air at 80°F.

Temperature of Hot Pipe — °F Temperature Difference — Pipe to Air — °F		150 70	200 120	250 170	300 220	350 270	400 320	450 370	500 420	550 470	600 520
Thickness of Insulation		2" PIPE									
Uninsulated	Approx. Btu Loss/Hr./Lin. Ft. of Pipe	90	180	280	400	550	720	910	1130	1380	1680
Standard	Btu Loss/Hr./Lin. Ft. of Pipe	14.0	26.0	38.5	52.0	67.0	83.0	99.0	117.0	136.0	156.0
	Efficiency, %	84.5	85.6	86.3	87.0	87.8	88.5	89.1	89.6	90.2	90.7
1½"	Btu Loss/Hr./Lin. Ft. of Pipe	11.0	21.0	31.0	42.5	54.0	66.5	80.0	94.0	109.0	126.0
	Efficiency, %	87.7	88.3	88.9	89.4	90.2	90.8	91.2	91.7	92.1	92.5
2"	Btu Loss/Hr./Lin. Ft. of Pipe	8.0	15.5	23.0	32.0	41.5	52.0	64.0	77.0	91.0	105.0
	Efficiency, %	91.1	91.4	91.8	92.0	92.4	92.8	93.0	93.2	93.4	93.7
Double Standard	Btu Loss/Hr./Lin. Ft. of Pipe	7.5	14.5	22.0	31.0	40.5	51.0	63.0	76.0	89.5	103.5
	Efficiency, %	91.7	91.9	92.1	92.3	92.6	92.9	93.1	93.3	93.5	93.8
2½"	Btu Loss/Hr./Lin. Ft. of Pipe	6.5	12.5	19.5	27.0	36.0	46.0	56.5	67.5	79.5	92.0
	Efficiency, %	92.8	93.0	93.1	93.2	93.4	93.6	93.8	94.0	94.2	94.5
3"	Btu Loss/Hr./Lin. Ft. of Pipe	5.5	10.5	16.0	23.5	31.5	40.5	50.5	61.0	72.0	83.5
	Efficiency, %	93.9	94.0	94.1	94.2	94.3	94.4	94.5	94.6	94.8	95.0
		3" PIPE									
Uninsulated	Approx. Btu Loss/Hr./Lin. Ft. of Pipe	130	250	400	580	790	1040	1310	1630	2000	2420
Standard	Btu Loss/Hr./Lin. Ft. of Pipe	19.0	34.5	52.0	70.0	90.0	110.5	133.0	159.0	186.5	213.0
	Efficiency, %	85.4	86.2	87.0	87.9	88.6	89.4	89.8	90.2	90.7	91.2
1½"	Btu Loss/Hr./Lin. Ft. of Pipe	14.5	26.5	40.0	54.0	69.5	85.0	101.5	119.0	136.5	155.0
	Efficiency, %	88.8	89.4	90.0	90.7	91.2	91.8	92.2	92.7	93.2	93.6
2"	Btu Loss/Hr./Lin. Ft. of Pipe	12.0	22.0	32.5	44.5	56.5	71.0	85.0	100.0	115.5	132.0
	Efficiency, %	90.8	91.2	91.9	92.3	92.8	93.2	93.5	93.9	94.2	94.5
Double Standard	Btu Loss/Hr./Lin. Ft. of Pipe	11.5	21.0	31.5	43.0	55.5	69.0	82.5	97.5	113.0	129.0
	Efficiency, %	91.2	91.6	92.1	92.6	93.0	93.4	93.7	94.0	94.4	94.7
2½"	Btu Loss/Hr./Lin. Ft. of Pipe	10.0	18.5	28.0	37.5	48.5	60.0	72.0	84.5	98.0	112.0
	Efficiency, %	92.3	92.6	93.0	93.5	93.9	94.2	94.5	94.8	95.1	95.4
3"	Btu Loss/Hr./Lin. Ft. of Pipe	8.5	15.5	24.0	33.5	44.0	54.5	66.0	79.0	92.5	107.0
	Efficiency, %	93.5	93.8	94.0	94.2	94.4	94.8	95.0	95.2	95.4	95.6
		4" PIPE									
Uninsulated	Approx. Btu Loss/Hr./Lin. Ft. of Pipe	160	320	510	740	1000	1310	1660	2070	2540	3070
Standard	Btu Loss/Hr./Lin. Ft. of Pipe	22.5	39.0	57.5	78.0	100.0	124.5	151.5	180.5	211.0	244.5
	Efficiency, %	86.0	87.8	88.8	89.5	90.0	90.5	90.9	91.3	92.8	92.9
1½"	Btu Loss/Hr./Lin. Ft. of Pipe	18.0	31.0	46.0	62.0	80.0	99.5	120.0	142.5	165.5	190.0
	Efficiency, %	89.0	90.3	91.0	91.6	92.0	92.4	92.8	93.1	93.6	93.8
2"	Btu Loss/Hr./Lin. Ft. of Pipe	15.5	26.0	38.0	51.0	65.5	81.0	98.5	117.5	137.5	158.5
	Efficiency, %	90.3	91.9	92.6	93.1	93.5	93.8	94.1	94.3	94.7	94.8
Double Standard	Btu Loss/Hr./Lin. Ft. of Pipe	14.0	24.5	36.0	49.0	62.5	77.5	94.0	111.0	130.0	149.0
	Efficiency, %	91.2	92.3	92.9	93.4	93.8	94.1	94.3	94.6	94.9	95.1
2½"	Btu Loss/Hr./Lin. Ft. of Pipe	13.0	22.5	33.0	44.5	57.0	71.0	85.5	101.0	117.5	134.5
	Efficiency, %	91.9	93.0	93.5	94.0	94.3	94.6	94.9	95.1	95.4	95.6
3"	Btu Loss/Hr./Lin. Ft. of Pipe	12.0	21.0	30.5	41.0	52.5	65.5	78.5	93.0	108.5	124.0
	Efficiency, %	92.5	93.4	94.0	94.5	94.8	95.0	95.3	95.5	95.7	95.9
		6" PIPE									
Uninsulated	Approx. Btu Loss/Hr./Lin. Ft. of Pipe	230	460	720	1060	1440	1890	2400	2990	3660	4450
Standard	Btu Loss/Hr./Lin. Ft. of Pipe	27.0	49.0	74.0	102.0	133.5	168.0	207.5	251.5	300.0	352.0
	Efficiency, %	88.3	89.4	89.7	90.4	90.7	91.1	91.4	91.6	91.8	92.1
1½"	Btu Loss/Hr./Lin. Ft. of Pipe	22.0	39.0	57.5	79.0	102.5	129.5	159.0	190.5	225.5	262.0
	Efficiency, %	90.4	91.5	92.0	92.5	92.9	93.1	93.4	93.6	93.8	94.1
2"	Btu Loss/Hr./Lin. Ft. of Pipe	19.0	33.0	47.5	64.0	83.0	103.0	126.0	151.0	178.0	207.0
	Efficiency, %	91.7	92.8	93.4	94.0	94.2	94.6	94.7	95.0	95.1	95.3
Double Standard	Btu Loss/Hr./Lin. Ft. of Pipe	18.5	31.5	46.0	61.5	78.5	97.5	118.5	141.0	164.5	189.0
	Efficiency, %	92.0	93.2	93.6	94.2	94.6	94.8	95.1	95.3	95.5	95.8
2½"	Btu Loss/Hr./Lin. Ft. of Pipe	18.0	30.5	44.0	59.0	74.5	92.0	111.0	132.0	154.5	178.0
	Efficiency, %	92.2	93.4	93.9	94.4	94.8	95.1	95.4	95.6	95.8	96.0
3"	Btu Loss/Hr./Lin. Ft. of Pipe	17.0	29.0	42.5	56.5	72.0	88.0	106.0	125.0	145.0	166.0
	Efficiency, %	92.6	93.7	94.1	94.7	95.0	95.3	95.6	95.8	96.0	96.3
		8" PIPE									
Uninsulated	Approx. Btu Loss/Hr./Lin. Ft. of Pipe	300	580	940	1360	1850	2420	3080	3840	4720	5720
Standard	Btu Loss/Hr./Lin. Ft. of Pipe	35.5	61.5	89.5	119.0	151.0	188.0	230.0	278.0	332.0	392.0
	Efficiency, %	88.2	89.4	90.5	91.3	91.8	92.3	92.5	92.8	93.0	93.1
1½"	Btu Loss/Hr./Lin. Ft. of Pipe	31.5	54.0	79.0	105.5	134.5	167.0	203.0	244.0	289.0	337.0
	Efficiency, %	89.9	90.7	91.6	92.3	92.8	93.2	93.4	93.7	93.9	94.1
2"	Btu Loss/Hr./Lin. Ft. of Pipe	24.5	43.0	64.5	85.5	109.0	135.0	162.5	194.0	228.0	267.0
	Efficiency, %	91.8	92.6	93.1	93.7	94.1	94.5	94.7	94.9	95.1	95.3
Double Standard	Btu Loss/Hr./Lin. Ft. of Pipe	21.5	38.0	56.0	73.0	92.5	113.5	137.0	163.0	191.0	224.0
or 2½"	Efficiency, %	92.8	93.4	94.0	94.6	95.0	95.3	95.5	95.7	95.9	96.1
3"	Btu Loss/Hr./Lin. Ft. of Pipe	19.5	35.0	50.5	67.0	85.0	105.0	125.5	148.0	171.5	196.5
	Efficiency, %	93.5	94.0	94.6	95.1	95.4	95.7	95.9	96.1	96.4	96.6



FIBERGLAS PF. PIPE INSULATION (SECTIONAL)
FOR STEAM OR HOT WATER LINES

THICKNESSES FOR VARIOUS TEMPERATURES AND PIPE SIZES

Fiberglas PF Pipe Insulation Temperatures from 111°F. to 599°F.

Temperature °F	Pipe Under 2"	Pipes 2" to 4"	Pipes over 4"
111 to 299	Standard	Standard	Standard
300 to 399	1½"	1½"	2"
400 to 499	1½"	2"	Double Std.
500 to 599	2"	Double Std.	2½"

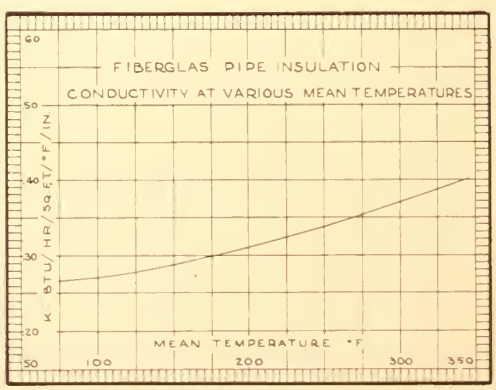
Temperatures from 600°F. to 799°F.

Pipe Size	Total Thickness	High Temperature Pipe Insulation Inner Layer	Fiberglas PF Pipe Insulation Outer Layer
Under 2"	2"	2"	None
2"	3¼"	1¼"	2"
2½"	3 5/16"	1 5/16"	2"
3" to 4"	3 9/16"	1 9/16"	2"
Over 4"	4"	1½"	2½"

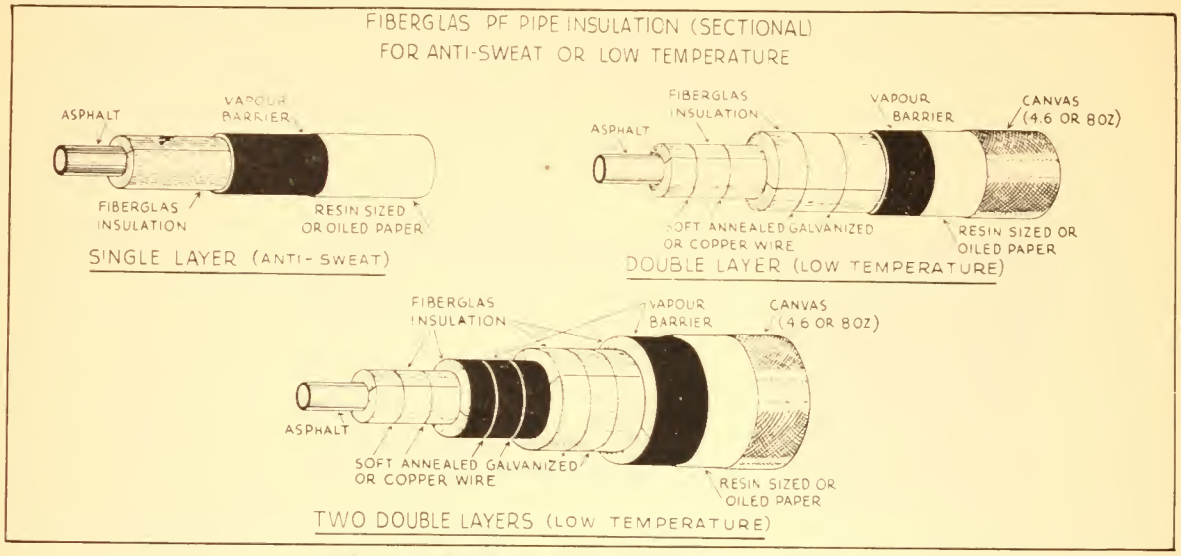
Temperatures from 800°F. to 1000°F.

Pipe Size	Total Thickness	High Temperature Pipe Insulation Inner Layer	Fiberglas PF Pipe Insulation Outer Layer
Under 2"	2"	2"	None
2"	3 5/8"	2 1/8"	1½"
2 ½"	3 5/16"	1 13/16"	1½"
3" to 4"	3 9/16"	2 1/16"	1½"
Over 4"	4"	2"	2"

CONDUCTIVITY AT VARIOUS MEAN TEMPERATURES



PIPE LINES



LOW TEMPERATURE INSTALLATIONS

PREPARATION OF SURFACE

All surfaces shall be thoroughly cleaned and dried before insulation is applied, and once installation has begun, the system shall not be put into operation until the application has been completed. Pipes and equipment to be insulated shall be relocated, if necessary to provide an uninterrupted clearance around the finished insulation of at least four (4) inches in all directions. Low temperature pipes shall not be located adjacent to heated surfaces.

APPLICATION OF INSULATION

The pipe surface to be (Fiberglas) insulated shall be primed or mopped with hot asphalt. Where one layer of double Standard is used, a suitable Vapour Barrier shall be installed on the outside of the outer layer. (Optional -- where one layer of double Standard is used, a suitable Vapour Barrier may be installed between the inner and outer layers, keeping the Vapour Barrier as thin as possible). Where two layers of Double Standard are applied the Vapour Barrier shall be placed between the inner two layers and the outer two layers, keeping the Vapour Barrier as thin as possible, and a second Vapour Barrier shall be placed on the outside of the outer two layers. All the joints in Pipe Coverings shall be staggered and joints in Vapour Barrier lapped 3 inches and sealed. Where single thickness pipe covering is applied a Vapour Barrier shall be applied on the outside only.

APPLICATION OF VAPOUR BARRIER

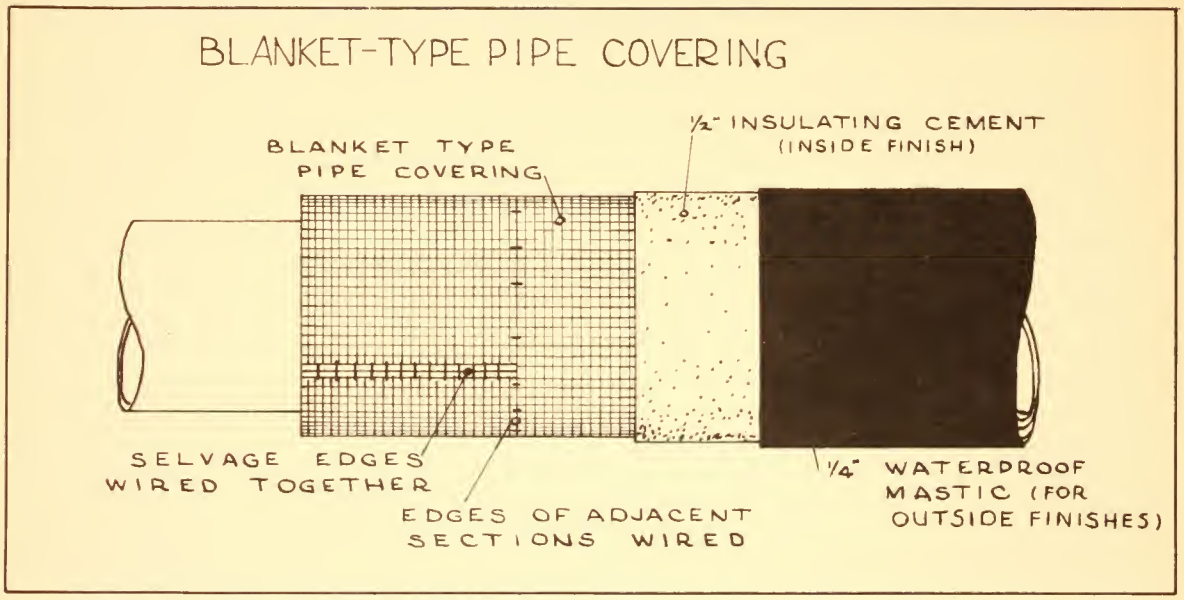
Over the final layer of Fiberglas, two layers of 15 pound saturated rag felt shall be applied with 3 inch laps, mopping each layer separately with hot asphalt.

A layer of resin-sized sheathing paper shall be applied over the final layer of 15 pound rag felt, lapping it 3 inches at all points and sealing the laps with asphalt. A jacket of 8 ounce canvas shall then be sewn or pasted over the resin-sized paper. If sewn the stitches shall be spaced not less than three to the inch located where least visible.

OUTDOOR PROTECTION

The Fiberglas insulation shall be protected with a jacket of #28 gauge galvanized sheet metal or with a 55 pound roofing felt. If sheet metal is used, each sheet shall be lapped 3 inches against the weather at all points and permanently secured in place with 1-1/2 inch galvanized iron bands spaced on 8 inch to 12 inch centres. If roofing felt is used as a jacket, all points shall be lapped as above and the jacket permanently secured in place with 1/2" galvanized bands or with copper or soft galvanized wires spaced on 6 inch to 8 inch centres.

LOW TEMP. INSTALLATIONS	
TEMPERATURE	THICKNESS
° F.	Inches
45 to 15	2
15 to -5	3
-5 to -20	4
-20 to -40	5
-40 to -60	6



FIBERGLAS BLANKET TYPE PIPE INSULATION

APPLICATION

The light weight of this insulation makes it easy to handle, especially when large sizes are involved, or when working from ladders or scaffolding. Application is accomplished by the simple operation of wrapping the "blanket" around the pipe and lacing or tying the facing selvages together with No. 16 gauge soft iron galvanized wire, keeping the longitudinal joint along the bottom of the pipe or as close thereto as practical application permits. On bends, the selvages should be laced or tied together on the outside radius of the bend, permitting shortening of the wire mesh on the inside radius of the bend to conform to the contour of the pipe. When properly applied, uniform thickness and density of insulation results.

WEATHERING. The resistance to weathering of the glass fibers is exceptionally high as they are made of chemically stable glass.

VIBRATION has no apparent effect upon the continued efficiency of Fiberglas Blanket Type Pipe Insulation. Severe tests made upon flat blankets of lighter density, both under conditions of high humidity and temperature and also in normally dry air, showed no settlement or signs of breakdown after more than a million oscillations at various amplitudes.

NONCORROSIVE. Severe tests of Fiberglas insulating wool in contact with both aluminum and steel, during which the test samples were subjected to alternating damp and dry conditions, indicate that these metals are in no wise injured by the presence of the glass fibers.

SELECTION TABLE*
FIBERGLAS PIPE INSULATION—BLANKET TYPE

Temperature °F.	PIPE DIAMETERS		
	3" UP TO 4"	4" UP TO 6"	6" AND UP
150 to 250	1"	1"	1"
251 to 350	1"	1"	1"
351 to 450	1"	1"	1½"
451 to 550	1"	1½"	1½"
551 to 650	1½"	1½"	2"
651 to 750	1½"	2"	2"
751 to 900	2"	2"	2½"
901 to 1050	2"	2½"	3"

*Indoor Applications only. For piping located outdoors, or exposed to the weather, thickness of insulation should be not less than ½ inch greater than shown.

FIBERGLAS BLANKET TYPE PIPE INSULATION

TOTAL HEAT LOSS AND EFFICIENCIES

Pipe Surfaces in Still Air at 80° F.

Thickness of Insulation		Temperature of Pipe	250	300	350	400	450	500	550	600	700	800	900	1000
		Temperature Difference - Pipe to Air	170	220	270	320	370	420	470	520	620	720	820	920
		12" PIPE												
Uninsulated	Approximate Heat Loss – Uninsulated in Btu/Hr./Linear Foot of Pipe		1340	1950	2660	3480	4480	5580	6850	8340	11780	16240	21620	28480
1"	Btu Loss/Lin. Ft. of Pipe		160	210	260	315	375	455	535	625				
	Efficiency %		88.1	89.2	90.2	90.9	91.6	91.9	92.2	92.5				
1½"	Btu Loss/Lin. Ft. of Pipe		120	160	210	250	285	340	410	465	635	840		
	Efficiency %		91.0	91.8	92.1	92.8	93.6	93.9	94.0	94.4	94.6	94.8		
2"	Btu Loss/Lin. Ft. of Pipe		90	110	140	180	225	260	300	360	480	645	850	
	Efficiency %		93.3	94.4	94.7	94.8	95.0	95.3	95.6	95.7	95.9	96.0	96.1	
2½"	Btu Loss/Lin. Ft. of Pipe		70	95	115	145	180	220	260	305	405	530	730	990
	Efficiency %		94.8	95.1	95.7	95.8	96.0	96.1	96.2	96.3	96.6	96.7	96.6	96.5
3"	Btu Loss/Lin. Ft. of Pipe		60	80	105	135	160	180	215	250	330	430	575	765
	Efficiency %		95.1	95.5	96.0	96.2	96.4	96.8	96.9	97.0	97.2	97.4	97.3	97.3
4"	Btu Loss/Lin. Ft. of Pipe		45	63	80	100	120	140	165	190	255	335	450	610
	Efficiency %		96.6	96.8	97.0	97.1	97.3	97.5	97.6	97.7	97.8	97.9	97.9	97.9
		16" PIPE												
Uninsulated	Approximate Heat Loss – Uninsulated in Btu/Hr./Linear Foot of Pipe		1650	2410	3300	4310	5500	6860	8450	10290	14580	20060	26800	35400
1"	Btu Loss/Lin. Ft. of Pipe		185	240	305	370	445	535	635	760				
	Efficiency %		88.8	90.0	90.8	91.4	91.9	92.2	92.5	92.7				
1½"	Btu Loss/Lin. Ft. of Pipe		140	190	235	280	320	395	450	530	710	980		
	Efficiency %		91.5	92.2	92.9	93.5	94.2	94.3	94.7	94.9	95.2	95.1		
2"	Btu Loss/Lin. Ft. of Pipe		105	135	170	205	245	290	340	405	540	715	990	
	Efficiency %		94.0	94.4	94.9	95.3	95.6	95.8	96.0	96.1	96.3	96.5	96.3	
2½"	Btu Loss/Lin. Ft. of Pipe		80	110	140	160	200	240	280	315	420	570	790	1090
	Efficiency %		95.2	95.5	95.8	96.3	96.4	96.5	96.7	97.0	97.1	97.2	97.1	96.9
3"	Btu Loss/Lin. Ft. of Pipe		70	90	115	145	165	200	230	260	350	465	620	830
	Efficiency %		95.8	96.3	96.5	96.7	97.0	97.1	97.3	97.5	97.6	97.7	97.7	97.7
4"	Btu Loss/Lin. Ft. of Pipe		55	72	90	110	130	150	170	205	270	365	475	640
	Efficiency %		96.7	97.1	97.3	97.5	97.7	97.8	98.0	98.1	98.2	98.2	98.3	98.2
		18" PIPE												
Uninsulated	Approximate Heat Loss – Uninsulated in Btu/Hr./Linear Foot of Pipe		1850	2680	3680	4820	6170	7700	9520	11520	16450	22550	30100	39750
1"	Btu Loss/Lin. Ft. of Pipe		190	240	310	375	460	545	660	780				
	Efficiency %		89.9	91.0	91.6	92.2	92.7	92.9	93.1	93.2				
1½"	Btu Loss/Lin. Ft. of Pipe		145	195	240	290	335	390	455	530	715	990		
	Efficiency %		92.2	92.7	93.5	94.0	94.7	94.9	95.2	95.4	95.7	95.6		
2"	Btu Loss/Lin. Ft. of Pipe		105	145	180	210	255	295	345	405	550	740	995	
	Efficiency %		94.4	94.6	95.1	95.7	96.0	96.2	96.4	96.5	96.6	96.7	96.7	
2½"	Btu Loss/Lin. Ft. of Pipe		85	110	145	170	205	240	280	320	425	585	790	1180
	Efficiency %		95.4	95.9	96.1	96.5	96.8	96.9	97.1	97.2	97.3	97.4	97.4	97.1
3"	Btu Loss/Lin. Ft. of Pipe		75	95	120	150	170	210	245	280	365	480	630	850
	Efficiency %		96.0	96.5	96.8	96.9	97.2	97.3	97.4	97.6	97.8	97.9	97.9	97.9
4"	Btu Loss/Lin. Ft. of Pipe		55	75	95	110	120	150	170	210	280	370	485	640
	Efficiency %		97.0	97.2	97.4	97.7	98.1	98.1	98.2	98.2	98.3	98.4	98.4	98.4
		20" PIPE												
Uninsulated	Approximate Heat Loss – Uninsulated in Btu/Hr./Linear Foot of Pipe		2040	2950	4080	5330	6820	8500	10520	12800	18200	24940	33500	44200
1"	Btu Loss/Lin. Ft. of Pipe		190	255	330	390	465	570	670	740				
	Efficiency %		90.7	91.4	91.9	92.8	93.2	93.4	93.7	94.3				
1½"	Btu Loss/Lin. Ft. of Pipe		145	195	240	295	340	410	465	555	735	1010		
	Efficiency %		93.0	93.4	94.1	94.6	95.0	95.3	95.6	95.8	96.0	96.0		
2"	Btu Loss/Lin. Ft. of Pipe		110	135	180	215	260	300	350	415	560	755	1230	
	Efficiency %		94.7	95.5	95.6	96.0	96.2	96.5	96.7	96.8	96.9	97.0	96.4	
2½"	Btu Loss/Lin. Ft. of Pipe		95	115	150	170	210	250	290	335	445	595	820	1300
	Efficiency %		95.4	96.1	96.4	96.8	97.0	97.1	97.2	97.3	97.5	97.6	97.6	97.1
3"	Btu Loss/Lin. Ft. of Pipe		75	95	120	150	170	210	245	280	365	480	630	850
	Efficiency %		96.3	96.8	97.1	97.3	97.5	97.6	97.7	97.8	98.0	98.1	98.2	98.1
4"	Btu Loss/Lin. Ft. of Pipe		55	75	95	110	120	150	170	210	280	370	485	640
	Efficiency %		97.3	97.5	97.7	98.0	98.2	98.3	98.4	98.4	98.5	98.6	98.6	98.6

TYPICAL METHOD OF APPLYING FIBERGLAS BLANKET TYPE PIPE INSULATION TO A 90° BEND

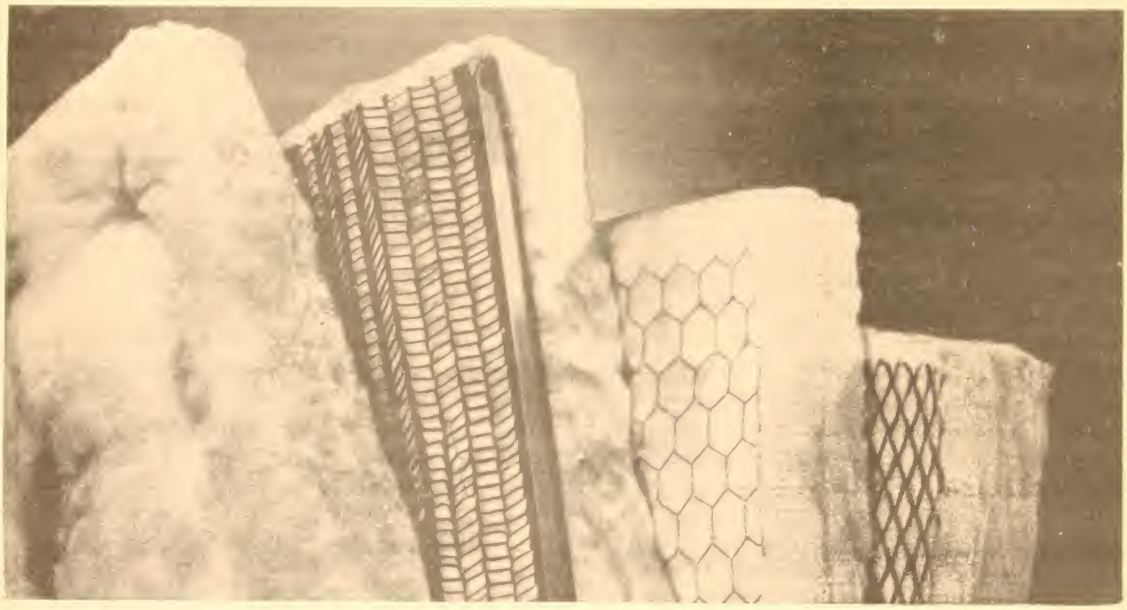
1 The insulation is cut to proper shapes, using wire snips for the wire netting and metal edge and an ordinary knife for the insulating wool.

2 The shapes are fitted in place and the individual wires at the edges twisted together. A smooth, tight, concentric insulation is the result.

3 On bends or other irregular surfaces, a sheet metal jacket may be impractical. Fiberglas Insulating Cement is applied over the insulation and troweled smooth. For outdoor applications, a weatherproof coating of Mastic Finish is applied after the Insulating Cement has thoroughly dried

4 On straight piping, a jacket of No. 28 gauge galvanized sheet metal may be applied. The metal jacket is installed to overlap by several inches the Mastic Finish on the adjacent bend. It is secured in place with 1/2" or 3/4" galvanized bands, machine stretched or crimped on approximately 8" to 12" centers.

FIBERGLAS METAL MESH BLANKETS



Fiberglas* Metal Mesh Blankets are flexible blankets of glass insulating wool faced on one or both sides with a metal mesh. Such facing fixes blanket position and provides a base for cement finishes.

USES

Fiberglas Metal Mesh Blankets are used for insulating heated industrial equipment in temperature ranges up to 1000° F. Such equipment includes boilers, cylinders, industrial ovens, large ducts and breechings, railway tank cars, stationary tanks, oil field and refinery equipment.

TYPES

Fiberglas Metal Mesh Blankets are fabricated into two types as follows:

Type No. 900 Blankets, are made of Fiberglas Insulating Wool, Type TW-F, described in Fiberglas Standards D4.2.1. Density of the wool is approximately 6 lbs. per cu. ft. One side often is without facing so as to conform to surface irregularities and projections, such as laps, rivet heads, etc. No. 900 Blankets can be used on hot surfaces at temperatures up to 1000° F.

Type No. 600 Blankets are made of Fiberglas PFL Insulation, described in Fiberglas Standards D4.3.1. Density of the wool averages 4-1/4 lbs. per cu. ft. In many applications but one side is faced because of the semi-rigid characteristic of Fiberglas PFL Insulation. No. 600 Blankets can be used on hot surfaces at temperatures up to 600° F.

PERFORMANCE IN SERVICE

VIBRATION. Fiberglas Metal Mesh Blankets, properly fastened in place do not sag, settle, or change in thickness. On the contrary, vibration fluffs out the wool fibers, thereby filling any voids.

NON-CORROSIVE. Severe tests, in which samples are subjected to alternating damp and dry conditions, prove Fiberglas Insulating Wools have no corrosive effects in contact with aluminum and steel.

LIGHT WEIGHT. Net weights per sq. ft., including facings and wire or asbestos cord ties, for various styles of Fiberglas Metal Mesh Blankets, Types No. 900 and No. 600, are shown below.

HEAT CAPACITY

The low heat capacity of Fiberglas Insulating Wool is explained in Fiberglas Standards D4.2.1. For purposes of rapid computation, heat capacities of Fiberglas Metal Mesh Blankets, based on a specific heat of .20 Btu per lb., exclusive of facing materials, are as follows:

Blanket Type	Per Sq. Ft., 1" Thick (Btu per Degree F.)	Per Cu. Ft. (Btu per Degree F.)
No. 900	.100	1.20
No. 600	.075	90

SIZES

Fiberglas Metal Mesh Blankets are fabricated into two standard sizes: 2 feet by 8 feet, and 2 feet by 4 feet. Special sizes are fabricated on order at extra cost.

INSULATING EFFECTIVENESS

Selection Charts on page 4 show the thicknesses of Types No. 900 and No. 600 Blankets required to decrease flat surface temperatures to desired levels. Comparisons of surface temperatures and heat losses in Btu per hr. per sq. ft. in still air at 80° F., prior to and after insulation, also are obtainable from the charts. In addition, thermal efficiencies of insulation are easily computed by use of the equation

$$100\% - \left(\frac{\text{Cold Surface Btu Loss}}{\text{Hot Surface Btu Loss}} \times 100 \right)$$

FIBERGLAS METAL MESH BLANKET - No. 900

HEAT LOSSES AND EFFICIENCIES§

Flat Surfaces in Still Air at 80° F.

Temperature of Hot Surface - °F		250	300	350	400	450	500	550	600	700	800	900	1000
Temperature Difference - Hot Surface to Air - °F		170	220	270	320	370	420	470	520	620	720	820	920
Bare Heat Loss - Btu per hour per sq. ft.		430	610	850	1100	1400	1750	2130	2570	3650	5000	6650	8700
Thickness													
1"	Btu Loss	38	51	65	81	100	120	144	173				
	Efficiency %	91 2	91 6	92 4	92 6	92 9	93 1	93 2	93 3				
1½"	Btu Loss	29	38	48	60	72	86	103	122	169			
	Efficiency %	93 3	93 8	94 3	94 5	94 9	95 1	95 2	95 3	95 4			
2"	Btu Loss	23	29	36	45	54	65	78	92	128	176		
	Efficiency %	94 7	95 2	95 8	95 9	96 1	96 2	96 3	96 4	96 5	96 5		
2½"	Btu Loss	18	24	31	38	45	53	63	75	103	141		
	Efficiency %	95 8	96 1	96 4	96 6	96 8	97 0	97 0	97 1	97 2	97 2		
3"	Btu Loss	16	20	25	31	38	45	53	62	87	119	161	
	Efficiency %	96 3	96 7	97 1	97 2	97 3	97 4	97 5	97 6	97 6	97 6	97 6	
3½"	Btu Loss	13	18	22	27	32	38	45	54	75	102	139	186
	Efficiency %	97 0	97 1	97 4	97 5	97 7	97 8	97 9	97 9	98 0	98 0	97 9	97 9
4"	Btu Loss	11	15	18	23	27	33	39	47	65	90	123	166
	Efficiency %	97 4	97 5	97 9	98 0	98 1	98 1	98 2	98 2	98 2	98 2	98 2	98 1
5"	Btu Loss	9	12	15	19	22	26	31	37	51	71	96	130
	Efficiency %	97 9	98 0	98 2	98 3	98 4	98 5	98 5	98 6	98 6	98 6	98 6	98 5
6"	Btu Loss	7	9	12	15	17	20	25	30	42	58	80	110
	Efficiency %	98 4	98 5	98 6	98 6	98 8	98 9	98 8	98 8	98 8	98 8	98 8	98 7

FIBERGLAS METAL MESH BLANKETS

Styles and Facing Materials

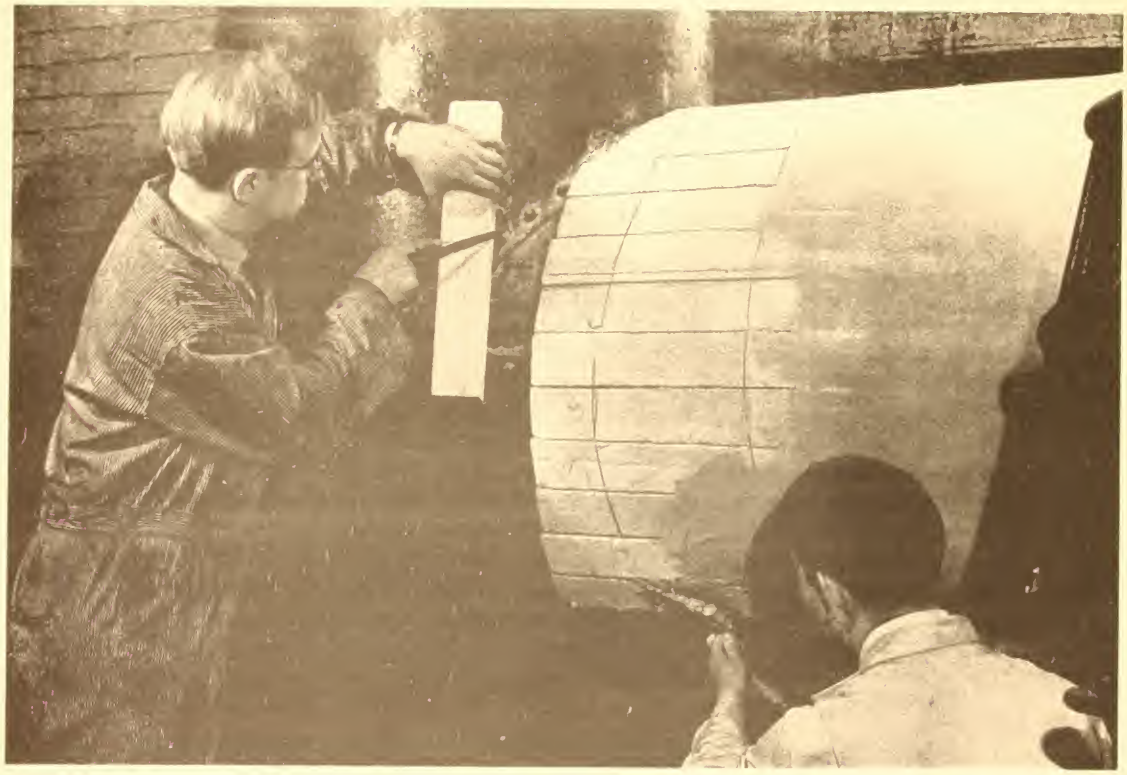
STYLE	ONE SIDE	OPPOSITE SIDE
HH	Hexagonal Wire (Poultry Mesh)	Hexagonal Wire
†HO		No Metal Facing
HL		Expanded Metal Lath
†LO	Expanded Metal Lath	No Metal Facing
LL		Expanded Metal Lath
†ATRO	⅜" Rib Lath, Rib Turned OUT	No Metal Facing
†RATO	⅜" Rib Lath, Rib Turned IN	No Metal Facing
ATRH	⅜" Rib Lath, Rib Turned OUT	Hexagonal Wire
RATH	⅜" Rib Lath, Rib Turned IN	Hexagonal Wire
ATRL	⅜" Rib Lath, Rib Turned OUT	Expanded Metal Lath
RATL	⅜" Rib Lath, Rib Turned IN	Expanded Metal Lath

†Featured Construction of Fiberglas Metal Mesh Blankets.

FIBERGLAS METAL MESH BLANKETS

Types and Thicknesses Generally Recommended

For Hot Surfaces	Type No. 900	Type No. 600
100°— 200° F	1" Thick	1" Thick
201°— 300° F	1½" "	1½" "
301°— 400° F	2" "	2" "
401°— 600° F	2½" "	2½" "
601°— 700° F	3" "	
701°— 850° F	3½" "	
851°—1000° F	4" "	



FIBERGLAS HIGH TEMPERATURE INSULATING BLOCKS

APPLICATION

Fiberglas No. 600 Block Insulation can be applied to flat or curved surfaces in accordance with standard insulation practice, using bands or tie-wires to hold them in place. They may be reinforced with 1" galvanized wire, then covered with Fiberglas Insulating Cement, and finished with Fiberglas Finishing Cement or Mastic Finish.

When Fiberglas No. 600 Block Insulation is applied to equipment operating above 400° F., the block should be applied while surfaces are not above 400° F. and the unit brought to maximum heat slowly the first time.

THERMAL CONDUCTIVITY. The thermal conductivity of Fiberglas No. 600 Block Insulation is .26 Btu per hour per square foot per inch thickness per degree F., at a mean temperature of 70° F.

FLEXURAL STRENGTH. The flexural strength of Fiberglas No. 600 Block Insulation is approximately 60 pounds per square inch.

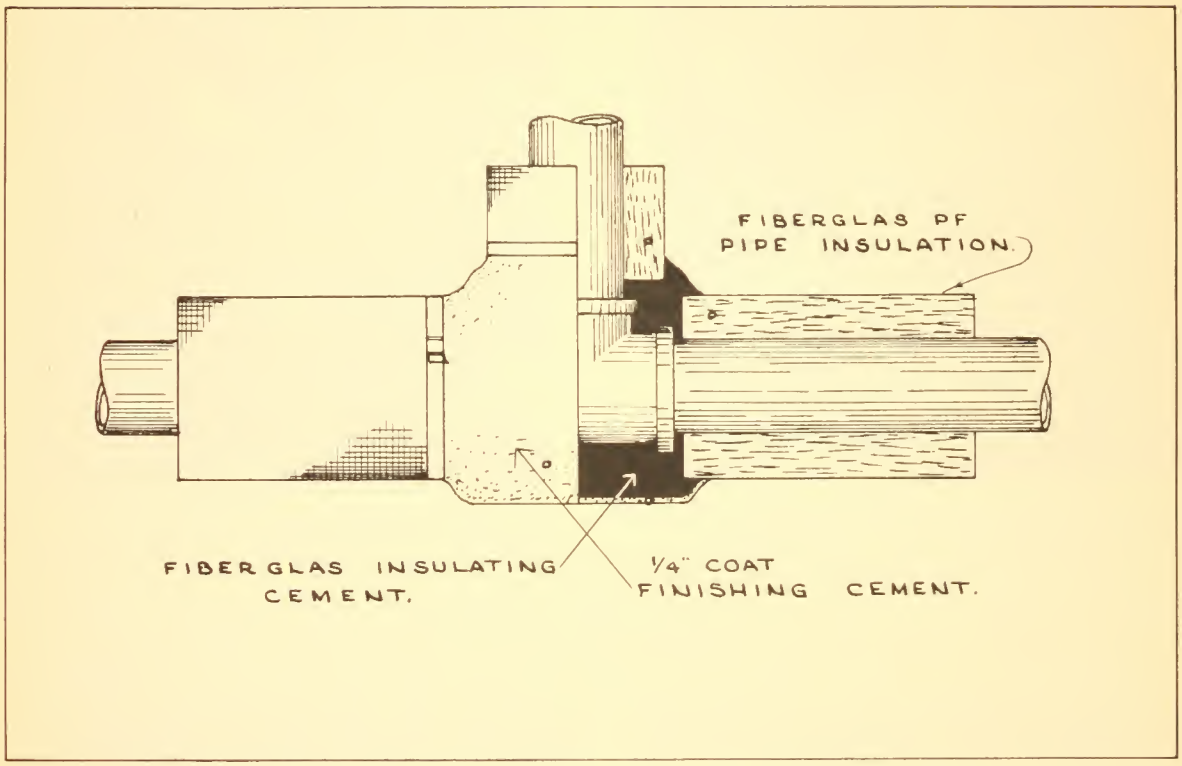
TEMPERATURE LIMIT. The recommended temperature limit of Fiberglas No. 600 Block Insulation is 600° F.

HANDLING QUALITIES. Fiberglas No. 600 Block Insulation has excellent handling qualities. It is easily cut and fitted and has adequate strength for shipment and application under ordinary service conditions. It does not tend to crumble.

DIMENSIONS OF BLOCKS

	Fiberglas No. 600 Block
Standard Sizes	6" x 36" 12" x 36"
Special Sizes (Made on order only)	6" x 18" 12" x 18" 9" x 36" 3" x 18"
Standard Thicknesses	¾", 1", 1½", 2"
Special Thicknesses (Made on order only)	—

FIBERGLAS INSULATING CEMENT



FIBERGLAS INSULATING CEMENT provides a monolithic insulation for pipes, tank, ovens, and other heated equipment; both regular or irregular shapes, indoors and out. It combines good thermal insulating value and ease of application. It may be used over steel, brick, and insulation blocks and blankets. When located outdoors or exposed to moisture or abrasion, a jacket of sheet metal or a coating of Mastic Finish should be applied to protect the cement.

Fiberglas Insulating Cement is made of nodulated Fiberglas Insulation, dry-mixed with refractory-type materials. It is easily mixed on the job. Approximately 28 gallons of clean fresh water should be used for each 100 lbs. of dry cement. When the cement is to be used on a hot porous surface such as fire brick, an additional 4 gallons per 100 lbs. of cement should be used. When applied and dried, it comprises countless dead air cells.

Fiberglas Insulating Cement is easy to apply, a feature that lowers installation time. Other advantages include full reclaimability up to 1000° F., low shrinkage or drying, good adhesive strength, and the provision of an excellent base for either Fiberglas Finishing Cements or Mastic Finish.

THERMAL CONDUCTIVITY of Fiberglas Insulating Cement is not more than .75 Btu sq. ft. per hour, per degree F. temperature difference, per inch thickness of material, at a mean temperature of 300° F.; and .64 Btu at 100° F. mean temperature. (See chart on page 3 for conductivity at various mean temperatures.)

The workman is applying a coating of insulating cement, which, adheres firmly to the wire netting. When dry, a weatherproof coat of Mastic Finish will be applied.

Plastic and adhesive characteristics of Fiberglas Insulating Cement permit direct application to highly irregular surfaces and around pipe flanges, bends, fittings and valves.

PREPARATION OF SURFACE. Surfaces to be insulated with Fiberglas Insulating Cement should be cleaned of dirt, loose scale, paint, oil or grease. Paint or grease should be removed with a caustic solution which then should be washed off with clean fresh water. Porous surfaces, such as fire brick, should be wet down thoroughly before the application of the insulating cement. If possible, the surface to be insulated should be kept hot to facilitate drying the cement.

REINFORCEMENT. Anchorage, where required or specified, should be provided in the form of clip angles, nuts or masonry nails of proper size. Additional support is recommended when cement is to be applied to light gauge metallic surfaces or when the surface expansion and contraction is excessive.

APPLICATION ON STEEL SURFACES. Fiberglas Insulating Cement of the recommended thickness (see table page 3) should be built up in separate coats not greater than 3/4". The first coat should be spotted on by hand then completely roughed in. Subsequent coats, 3/4" thick or less, should be applied after the preceding coats have dried until the total recommended thickness is reached.

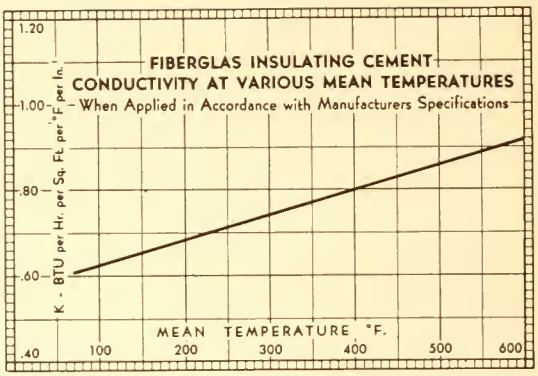
When the total insulation thickness is greater than one inch; or when the cement is to be applied to the under side of equipment; or, when the equipment is subject to vibration, a layer of galvanized wire netting should be applied between every second coat. When used, the wire netting should be stretched tightly over the dry cement and securely wired in place with 16 gauge galvanized wire.

APPLICATION ON BRICK SURFACES. Fiberglas Insulating Cement should be applied to a thickness that will result in a safe temperature gradient for all materials in the composite construction. Where reinforcing is required, masonry nails approximately 1-1/2" long should be driven into the mortar joints on approximately 8- to 12-inch centers so that the heads extend 3/4" from the surface of the brick. The first layer of cement should be applied nearly flush with the nail heads. Then galvanized wire netting should be stretched tightly over the cement and secured to the nails. The second layer of insulating cement should be applied approximately 1/2" to 3/4" thick.

APPLICATION OF FINISH

Fiberglas Insulating Cement may be finished with Finishing Cement if located indoors and not exposed to moisture or abrasion; or with Mastic Finish when located out of doors or exposed to moisture.

MASTIC FINISH is usually applied over a base coat of either insulating or finishing cement. It should be stirred thoroughly in the container before application. Prior to the application of the Mastic Finish and after the cement has thoroughly dried, 1" galvanized wire netting should be stretched tightly over the surface and wired in place with 16 gauge wire. The finish should be trowelled in place approximately 1/4" thick (wet), which will dry to about 1/8". It is important that it is trowelled well into the wire netting.



CHARACTERISTICS OF CEMENT & FINISHES

Physical Properties	Fiberglas Insulating Cement
Wet Coverage	62 board feet per 100 pounds.
Dry Coverage	52 board feet per 100 pounds.
Appearance When Dry	Light tan, relatively smooth, hard finish
Temperature Limits	Recommended to 1400 degrees F. Can be used to 1500 degrees F. — Fully reclaimable to 1000 degrees F.

RECOMMEND THICKNESS FOR INSULATING CEMENT*

°F	Thickness (Inches)
Up to 200	1
200 to 400	1½
400 to 500	2½
500 to 600	3
600 to 700	3½
700 to 900	4
900 to 1100	4½
1100 to 1300	5
1300 to 1600	5½

* Usually applied ½" thick over blankets and blocks as a base coat for desired finish. For built-up applications on irregular surfaces, thicknesses may be used up to the practical limit.